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# The Longitudinal Belly Flop with a Splash: Lessons Learned, Data Gained

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# THE LONGITUDINAL BELLY FLOP WITH A SPLASH: LESSONS LEARNED, DATA GAINED

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## BACKGROUND

At a midsize private liberal arts college located in Spokane, Washington, library faculty made connections with one of the new Engineering professors in 2017. The professor taught an engineering course, ENSC 191, that was designed to reach every freshman engineering student at the university. Sensing an opportunity, library faculty worked with the professor to design a longitudinal assessment to check in with the same students in their senior year to see what concepts they had retained and what had changed in their knowledge during the time between. However, what actually happened in practice was that the instruction session went as planned with the freshman students, but time passed and by the time the senior year class was booked and we looked back to see exactly what we wanted to recreate, the original assessment data was not to be found. Not only was the information itself missing, but there had been organizational and staffing changes—including retirements, sabbaticals, and the hiring of a new STEM librarian in 2019—that affected follow through on the project. All of this, while somewhat unexpected, could have been better prepared for and addressed by a good data management plan. This article is a reflection on what we did wrong and how we salvaged a ruined assessment, but more importantly, what could have been done by others to prevent a longitudinal failure—focusing on research data management.

## (INTENDED) METHODOLOGY

Before the Fall 2019 semester began, librarians met with the engineering professor to map the ACRL Framework onto the learning outcomes used by the Accreditation Board for Engineering and Technology (ABET), the accrediting body for the engineering school. We used this as a measure to find the shared values between the two fields, and to find a way to focus our instruction and assessment on the perceived needs of the engineering school. The designed assessment was intended to be a pre- and post-test given to students in both their freshman and senior years. The idea behind the design was that these two scores could be used as comparison to see how well the students retained information and what they learned over the course of their academic career. Likewise, we wanted to see what information still had value to them by the time they were in their final year at the university. At the time of this project, engineering was an area that was being underserved by the library. Hiring a STEM librarian in 2019 was a decision made in part to address these issues of departmental need. Reconstructing the original instruction and assessment from what fragments we could find, we were able to find the original engineering articles from a variety of sources that we had asked students to read, as well as a list of questions about the articles to get a sense of how they interpreted each article as to its academic merit, credibility, and what informational need it satisfied. There were also portions of our testing tools that had students rank each article by its perceived audience, be that a scholarly article, popular magazine, field literature, or an internet blog. The idea was that students would become familiar with the differences between source types, and in which context each of them was useful.

## LONGITUDINAL ASSESSMENT

One of the best tools for conducting longitudinal assessments is to create a research data management plan (RDM). These plans ask researchers to track how their data will be collected, preserved and shared for years down the line and reflects the changing nature of research data. Many government funding agencies—such as the National Science Foundation (NSF), National Institutes of

Health (NIH), and National Endowment for the Humanities (NEH)—have been driving agents in requiring researchers to use RDM plans. Although our research was not funded by an outside agency, we could have benefitted from the structure provided by an outside agency. Our plan had been to assess the freshman class of engineering majors in Fall 2017, and reach out to them again in their senior year in 2020. When we first came up with the idea for our assessment, we knew what data we were looking for and how we would gather it on the front end of the project. What we did not have a plan for was how we would maintain and monitor the data that we gathered in the years between the two surveys. Instead, we had an informal idea that our tests would show that freshman engineering students knew a little bit about information retrieval and sourcing accurate material, but would not be able to distinguish between the specifics of trade journals and scholarly material, and we expected that after instruction this knowledge would increase. Our curiosity hinged on retention, in that we were unclear on whether or not the students would still hold this knowledge into their senior years. This was in part because prior to the hiring of the STEM librarian, most engineering students did not receive instruction after their freshman year. RDM is largely content-agnostic, in that the material you're collecting is not as significant as how you plan to maintain it.

In the fall of 2020, in part due to the enthusiasm of the new STEM librarian, we remembered our long-dormant assessment project and began the initial steps of what we assumed would be finalization of the project. During the time in between 2017 and 2020, we had a few instances at the beginning of school years when we would check in to see what needed to be done on the project. The project had been approved by the Institutional Review Board in late 2018 and during the intervening years, members of the IRB Board contacted us to confirm that the project was still underway. We assured the IRB that the project would be completed on time, but we did not think in that moment to review where the project actually stood, either in terms of maintaining our existing records or making sure that we still held an idea of where things would go next. However, once we had the senior year class scheduled for library instruction and the STEM librarian was there to remind us that we were about to teach to over 100 students, we realized that whether or not we had our original material in hand, we still had an amazing assessment opportunity that we would be foolish to bypass. We now had access to Qualtrics survey software, which we did not have access to three years earlier. We sent a link out to the students at the beginning of class to ask them two questions: 1) *Do you recall attending a library session as part of your freshman year ENSC 191 course?* and 2) *Have you ever had a library session during your time at Gonzaga that was offered in a non-engineering course*? It was through this pivot that we were able to glean some important information about retention as well as figure out how we could redo the project in the future.

The results of this simple assessment were not as complex as our original plan from 2017, but they still allowed us to glean insights. We learned from this that our students held a general memory of the original course, though we could not glean what they retained from the specifics of the course. The second question, however, told us the most revealing information, which was that almost none of the engineering seniors had encountered library instruction outside of that provided as part of engineering courses, of which only two reliably include library instruction as part of the curriculum every year. This demonstrated a huge gap for these students. We had a sense of this gap's existence already, in that we knew how little we were reaching specific engineering courses, but we didn't have a clear sense of what the individual engineering student's academic path was exposing them to. As things currently stand, the average engineering student is not receiving much information literacy instruction of any kind. This information, backed now by our new data as well as our existing knowledge and intuition, will allow us to provide more and better instruction for this growing community of students.

## Literature Review

Our focus when reviewing the literature was on engineering assessments and the current ideas around research data management, particularly examples of the imperfect. Many studies looked at their research projects through the lens of federal grants to see how well they were complying with RDM (Cummings et al., 2020), and using a mixture of focus groups and surveys they found clarity on how researchers viewed the help of RDM after the fact, and funder mandates had slowly created research practice change over time. Similarly, RDM is not a new concept in the library field, but its adoption has been strengthened by funder mandates and new hiring of functional specialists like Scholarly Communication librarians that help drive home the point to faculty at large (Cox, Kennan, Lyon, & Pinfield, 2017). We found the work of Kristin Briney to be particularly informative in how librarians, as researchers, could apply their own methods to RDM as well as disseminate this to other researchers outside of the LIS field (Briney, 2019). In particular, she focuses on inadequate understanding of data management that can cause issues. To take a meta view of the greater context of RDM, we recommend the visualization work that shows how the conversation around RDM has changed over the course of the past two decades (Zhang & Eichmann-Kalwara, 2019). Overall, the support for RDM stands strong among librarians, particularly among the STEM fields, but the work has largely been taken up in response to funder demands. There is still a chance of human error, like our own well-intentioned library-based research projects exhibited.

## Recommendations

After much reflection on where things went wrong with our assessment, we are committed to do the following in the future in order to prevent research failures like ours. As a part of any assessment plan, before any research has begun, a detailed RDM plan

should be implemented. This involves a multi-phased assessment that begins with a discussion of not just what the project's aim is, but what type of data you want to collect, and how it will be dispersed and maintained both during and after the project has been completed. The DMPTool (dmptool.org) is a tool that helps researchers new to the process create their own research data management plans that reflect the varied requirements of individual funders and institutions. As this was an independent project, we did not need to take that under consideration, but going through the legwork can be helpful practice both for future research as well as bringing our own skills up to speed for helping our faculty across the institution when they come to us for help. We also recommend that if you fail or miss the mark on your intended assessment and information, take a look at what you do have available and try to find the silver lining. There may still be valuable ways to assess and gather information, even if it is not what you originally intended.

## CONCLUSION

We started out the project with big ambitions, but without a strong framework to support those ambitions. We had the grace to see what could be salvaged from memories and still-extant paperwork, but we likely would not have had to do such if we had built checks and structure into the process at the outset to keep our memories sharp. Our hope is that others might learn from our failures: not in that they never attempt longitudinal research, but rather that they build in the support systems that they need at the beginning in order to ensure that future success is not contingent only on (fallible) human memory. The literature firmly supports that data management plans work, but structure must be put in place in the beginning of a research project if you intend to ensure long term success. Staffing changes created opportunities for paperwork and plans to become lost, but this can be prevented with succession planning and built-in reminders. Finally, opportunities come from realizing what options are available, particularly from normalizing your daily workflow into a strategic method of retaining information. Our failure was the everyday failure of overloaded workflows and staffing changes that happen at every library, but our gain was in finding ways to navigate the failure into valuable data and we hope that you can learn from that in your own workflow.

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